Amendments to the Specification:

Please replace the paragraph beginning at page 1, line 3, with the following rewritten paragraph:

-- ~~Inventors~~ Inventor: Kenneth Johnson--

Please replace the paragraph beginning at page 8, line 1, with the following rewritten paragraph:

--Optical metrology systems apply an incident field ψ_{in} to sample 200 and measure the resulting [[the]] output field ψ_{out}. By analyzing the output field ψ_{out} optical metrology systems are able to ascertain underlying measurement characteristics about sample 200, such as line sizes and spacings, film properties and thicknesses. The present invention provides a method for rapidly correlating measurements of the output field ψ_{out} to characteristics of this type. Prior to using this method, a library or database is constructed using a parameterized model to represent sample 200. The parameterized model allows a theoretical optical response of sample 200 to be calculated as a function of a set of one or more parameters. Each parameter within the parameter set corresponds to a measurement parameter associated with sample 200 (such as line width, line profile, layer thickness, etc.). The parameterized model is used to build a database. For this task, a series of parameter sets are defined. The theoretical model is evaluated for each parameter set and the resulting optical response is stored (in association with the corresponding parameter set) in the database. The finished database functions as a mapping between the series of parameter sets (measurement characteristics) and their associated optical responses (measurements of the output field ψ_{out}).--

Please replace the paragraph beginning at page 8, line 26, with the following rewritten paragraph:

--In response, database searching module 304 uses a ~~bet-fit~~ best-fit strategy to locate the closest matching theoretical optical response within database 302. Database searching module 304 then returns the closest matching theoretical optical response along with its associated parameter set. In this way, database searching module 304 provides a mechanism for mapping measured optical responses to matching parameters sets. The mechanism operates with

a degree of built-in granularity and only returns optimal results when a target optical response exactly matches a theoretical optical response that is included in database 302.--

Please replace the Abstract beginning at page 16, line 2, with the following rewritten paragraph:

--A method for rapidly analyzing data gathered during scatterometry and related methods uses a combination of database lookup, database interpolation and theoretical model evaluation. Database lookup is used to provide an initial mapping between a measured optical response and a set of associated measurement parameters. Interpolation is then used to refine the optical response and parameters ~~beyond the accuracy provided by the database~~. A theoretical model is then repeatedly evaluated to refine the optical response and parameters ~~beyond the accuracy provided by interpolation~~ previously refined by the interpolation. In this way, the present invention avoids the inaccuracies associated with traditional interpolation-based analysis and without incurring the computational complexity associated with real-time database supplementation.--